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ABSTRACT

The document presents a collection of articles about marijuana. Article 1 reports on the results of a study by the National Academy of Sciences on the health effects of marijuana. A summary report of adverse health and behavioral consequences of cannabis (marijuana) use is provided in article 2. Article 3 presents the Surgeon General's warnings on marijuana and article 4 also focuses on the risks associated with marijuana use. Article 5 discusses federal policy regulating marijuana use. The final articles report on a possible link between marijuana contaminants and certain health problems. The document concludes with an annotated bibliography of over 40 related books and articles. (LH)

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Marijuana

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"The verdict is that there is no verdict..."

Major Pot Study Released

WASHINGTON—Following decades of heated debate, more unanswered questions than conclusive facts exist regarding the health effects of marijuana, according to a newly-released study by the National Academy of Sciences.

George Farnham, NORML
"debunks reefer madness hysteria"

The 15-month, $454,000 study, conducted by a special blue-chip panel selected by the Academy's Institute of Medicine, identified a number of "reversible, short-term health effects" produced by the drug, including impaired coordination and short-term memory loss. The panel refused, however, to speculate about possible long-term health effects, citing a lack of reliable evidence.

The study, considered the most comprehensive examination of the drug undertaken since the 1972 report of the National Commission on Marijuana and Drug Abuse, concluded with a call for intensified research, stating that "what little we know for certain" is cause for "serious national concern."

Writing in the March 11 issue of *The New England Journal of Medicine*, Journal Editor Arnold S. Relman, who chaired the Academy panel, noted that the panel's report would likely lend "no support to zealots on either side of the argument."

"The report finds the present truth to be somewhere between the extremes," Relman said. "The verdict of the experts is that there is no verdict."

The complete report, published under the title *Marijuana and Health*, assesses in detail current scientific information relating to marijuana's effects on human health and behavior. Included in the panel's findings was a clear connection between use of the drug and temporary alterations in brain function and behavior. However, the study found "no convincing evidence" that prolonged use of the drug produces permanent changes in brain structure and functioning or human behavior.

Noting that heavy users appear to develop mild physical tolerance to marijuana, the report warned that the drug can cause transient episodes of anxiety, confusion, or panic in some users and may intensify pre-existing mental disorders. The panel did not, however, find concrete evidence in support of marijuana's alleged role as a "stepping-stone" to use of stronger drugs or the cluster of behavioral symptoms known as the "amotivational syndrome," arguing that "available evidence does not establish if marijuana use . . . is a cause or a result" of such conditions.

The study uncovered solid evidence linking marijuana to significantly increased levels of heart rate and blood pressure, but stated that these temporary changes were likely to be of concern only to individuals with underlying cardiovascular disorders. More seriously, the panel found a strong association between marijuana smoking and respiratory impairment, including a strong possibility of lung cancer after extended use.

While the report confirmed clinical studies documenting a

Lee Dogoloff, ACM
"justifies serious national concern"

"modest reversible suppressive effect" in human male sperm production as well as interference with ovulation in female monkeys, it found no satisfactory proof that the drug affects human fertility. Urging

(Continued on page 20)

Pot Study

(Continued from page 3)

more adequately controlled studies of marijuana's effects on fetal development, the panel reported that it is impossible at this time to conclusively link marijuana to either birth defects or genetic damage.

Despite the reluctance of panel members to render a verdict on the health consequences of marijuana use, representatives from both sides of the debate found ammunition in the study's cautiously-worded conclusions.

Describing the study as "objective and unbiased," George Farnham, national director of the National Organization for the Reform of Marijuana Laws, said he felt the Academy report "debunks the reefer madness hysteria that has been prevalent for many years."

Lee Dogoloff, former Carter drug advisor and executive director of the American Council on Marijuana and Other Psychoactive Drugs, also found reason to be pleased with the Academy study. "We certainly agree with the conclusion which, as we see it, says that from all we know about marijuana . . . that there is cause for serious national concern," Dogoloff told **DSN**. "All we know says it's unhealthy, but we don't know how unhealthy it is."

The panel also reviewed evidence regarding possible therapeutic applications of marijuana in the treatment of glaucoma, asthma, epilepsy, and the nausea and vomiting associated with cancer chemotherapy. Describing present evidence as "incomplete," the committee urged expanded research into medical use of the drug.

The panel, which was composed of experts in various medical specialties who had not been previously committed to either side of the marijuana issue, did not formulate policy recommendations concerning marijuana's current legal status.

WORLD HEALTH ORGANIZATION • ADDICTION RESEARCH FOUNDATION

Report

ON ADVERSE HEALTH AND BEHAVIORAL CONSEQUENCES OF

Cannabis Use

SUMMARY

The acute use of moderate doses of cannabis produces a state of intoxication. This is associated with a dose-related impairment of the ability to drive a car or operate complex machinery. In some situations, the user may not feel the desired euphoric state but rather may experience a short-lived dysphoric reaction which can range in intensity and character from mild anxiety to an acute psychosis. Other acute physiological effects are also transient and do not appear to be of major significance in individuals with no pre-existing disease.

Intermittent use of low-potency cannabis is not generally associated with obvious symptoms of toxicity. Daily or more frequent use, especially of the highly potent preparations, can produce a chronic intoxication which may take several weeks to clear after drug use is discontinued. The seeming inconsistency of this observation throughout the world may reflect differing exposures to THC because of the large variation of potencies and smoking techniques, as well as different cultural preferences for the route of administration.

Respiratory toxicity is observed in heavy users and is probably related to smoke components other than THC. Therefore its severity may depend more on the smoking techniques employed by the user and the combustion properties of the material, than on the THC content. Cannabis effects on the hormonal, reproductive, and immunological status of these users is, as yet, unclear.

Chronic administration of cannabis results in the development of tolerance to a wide variety of the acute drug effects in both humans and experimental animals. Though scientific opinion is more divided on the question of dependence on cannabis, there is now substantial evidence that at least mild degrees of dependence, both psychological and physical, can occur.

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Some individuals may be particularly susceptible to the effects of cannabis for a variety of reasons. Adolescents who are undergoing rapid developmental change and elderly populations with decreased rates of drug metabolism, increased prevalence of disease and a more conservative and less flexible mental set may be more sensitive to the effects of cannabis and other drugs. The symptoms of patients with a variety of diseases including various forms of mental illness, diabetes, cardiovascular disease or epilepsy may be exacerbated by cannabis use. Interactions with a variety of substances including tobacco and alcohol may also potentiate the observed effects.

The epidemiological studies necessary to assess the frequency of adverse effects and to relate their occurrence to factors such as potency and amount of cannabis used, length of exposure, set and setting have not, as yet, been conducted. The low prevalence of adverse effects observed in field studies of small numbers of heavy users suggests that the adverse effects described in many of the clinical reports occur relatively infrequently in these carefully selected populations. Given that millions of individuals are now using the drug, even relatively infrequent but serious adverse consequences could be of public health significance.

The results of experimental studies in animals have consistently demonstrated toxicity at doses comparable to those consumed by the human who smokes cannabis several times per day. Respiratory toxicity, CNS dysfunction, endocrinological disturbances, reproductive deficits, and immunosuppression have all been observed after treatment with THC or cannabinoids in experimental animals. Most, but not all, of these effects disappear when treatment is discontinued. *In vitro* studies have also been used to demonstrate cannabis-induced cytotoxicity. The results of these experiments are, for the most part, qualitatively consistent with the *in vivo* observations, and may provide valuable information about the mechanisms of action of the cannabinoids and other plant components or products of pyrolysis.

CENTERS FOR DISEASE CONTROL

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

August 13, 1982 / Vol. 31 / No. 31

The Surgeon General's Warning on Marijuana

The Surgeon General of the Public Health Service has issued the following warning on marijuana:

Marijuana use is a major public health problem in the United States. In the past 20 years, its use has increased 30-fold; it is estimated that more than a quarter of the American population has used it. The age at which persons first use marijuana has decreased gradually to the junior high school years. Until recently, nearly 11% of high school seniors used it, and although that figure has declined to 7%, its daily use still exceeds that of alcohol; more high school seniors use marijuana than smoke cigarettes. In a recent study, 32% of those surveyed had used marijuana during the previous 30 days, while 25% had smoked tobacco.

On March 24, 1982, the Department of Health and Human Services submitted to Congress a report reviewing the consequences of marijuana use. *Marijuana and Health, 1982,* ninth in a series, is primarily based on two recently conducted, comprehensive, scientific reviews by the Institute of Medicine of the National Academy of Sciences, the Canadian Addiction Research Foundation, and the World Health Organization (WHO). Both independent reviews corroborate the Public Health Service's findings of health hazards associated with marijuana use: Acute intoxication with marijuana interferes with many aspects of mental functioning and has serious, acute effects on perception and skilled performance, such as driving and other complex tasks involving judgement or fine motor skills.

Among the known or suspected chronic effects of marijuana are:

1. short-term memory impairment and slowness of learning.
2. impaired lung function similar to that found in cigarette smokers. Indications are that more serious effects, such as cancer and other lung disease, follow extended use.
3. decreased sperm count and sperm motility.
4. interference with ovulation and pre-natal development.
5. impaired immune response.
6. possible adverse effects on heart function.
7. by-products of marijuana remaining in body fat for several weeks, with unknown consequences. The storage of these by-products increases the possiblilties for chronic, as well as residual, effects on performance, even after the acute reaction to the drug has worn off.

Of special concern are the long-term developmental effects in children and adolescents, who are particularly vulnerable to the drug's behavioral and psychological effects. The "amotivational syndrome," characterized by a pattern of energy loss, diminished school performance, harmed parental relationships, and other behavorial disruptions, has been associated with prolonged marijuana use by young persons. Although more research is required, recent national surveys report that 40% of heavy users experience some or all of those symptoms.

The Public Health Service concludes that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health, and it supports the major conclusion of the National Academy of Sciences' Institute of Medicine.

The Harvard Medical School Health Letter

VOLUME V NUMBER 8 JUNE 1980

MARIJUANA — WHAT ARE THE RISKS?

After several years of being more or less ignored, marijuana is again attracting attention as a potential health problem. The current concern does not arise because there are any major new findings about the health effects of marijuana, but rather because marijuana is being consumed in larger amounts and by younger people.

Only in the past fifteen years has marijuana become a truly common recreational drug in the United States. By 1977, some 43 million Americans had tried marijuana and over 16 million used the drug regularly. Use has been increasing most rapidly among young teenagers; in 1977, at least 4 million youngsters between the ages of 12 and 17 (about one-sixth of the total population of this age) reported that they were using marijuana. In 1979, 10 per cent of high school seniors claimed to be daily users.

How will this change in the nation's habits affect the physical and mental health of Americans? Unfortunately, there is no conclusive evidence on the subject. Tobacco and alcohol are still our major problem drugs — the most frequently used and the most costly to health. On the basis of information assembled so far, marijuana appears to be relatively safe — but the same thing could have been said about tobacco in 1920. After experimenting on themselves for a half century, during which the amount of smoking increased dramatically, Americans (and many others) proved that smoking tobacco is a deadly habit. Now marijuana is the substance being tested and once again people must be their own guinea pigs. Animal experiments can give us some clue as to possible risks, but they cannot be trusted to predict the actual outcome in human users. Experiments with people are possible, but ethical considerations and time limitations restrict their utility. Even observations made on heavy marijuana smokers elsewhere (Jamaica, Costa Rica, Egypt, Greece) have limited applicability to Americans because of differences in environment and pattern of use.

HIGHS AND LOWS: People using marijuana for the first time are commonly motivated by curiosity about its effects or by the urging of friends. Those who return to it usually want the "high" — a mild euphoria, a loosening of inhibitions, and possible alterations in the quality of perceptions and sensations without true hallucinations. Other aspects of the marijuana high are extremely variable. The drug's subjective effects usually last for two or three hours.

Objective changes also occur. While high, marijuana users may become somewhat clumsy (though they may feel graceful); they react more slowly than normal, perceive the passage of time less accurately, pay attention less well, and do arithmetic less well; they also show defects in short term memory during the high. A serious threat to health from this condition is impaired driving; even in low doses, marijuana clearly interferes with driving or piloting skills (although it does not

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appear to stimulate aggressiveness behind the wheel the way alcohol does). Moreover, the effect on driving skills lasts several hours beyond the period when a person feels high: even someone who feels "normal" drives worse than usual. It is foolish and dangerous to drive while under the influence of marijuana.

A few individuals may react to the marijuana high by becoming extremely anxious; they have a minor "bad trip." As a rule, this problem is best handled by reassuring them and helping them wait out the period of intoxication. There is no solid evidence that other, more serious or lasting psychological effects are likely to result from marijuana use. A marijuana high may trigger prolonged symptoms in unstable people, but does not itself appear to be responsible for mental illness.

Some heavy users of marijuana can become tolerant to its effects — meaning that they have to smoke larger amounts than before to get the high. A few may become dependent on marijuana — and there are a few reports of people showing physical symptoms when they stop using it. True addiction of the sort produced by nicotine or heroin seems to be rare or nonexistent.

Marijuana has been blamed for leading to apathy, loss of motivation, and narrowing of interests in people who use it heavily. There is no evidence that the drug does indeed produce such an "amotivational syndrome." On the contrary, young people who are depressed and have low expectations for themselves — and whose parents expect little of them — are more likely than others to make heavy use of marijuana. In other words, heavy use may be a symptom of depression and low self-esteem, rather than a cause.

PHYSICAL CONSEQUENCES: No convincing report has yet been published to show that marijuana permanently damages the brain. It would not be particularly surprising if there were some effect from heavy, prolonged use, but the weight of the evidence, at the moment, suggests that there is none.

THC (tetrahydrocannabinol, the "active ingredient" of marijuana) opens the air passages of the lungs, and for this reason smoking marijuana during an asthma attack was sometimes recommended in the last century, when medicinal use of the drug was still legal. But heavy smoking, it now appears, has the opposite effect: a narrowing of the air passages and inflammation of their lining. Sufficiently heavy, long-term marijuana smoking probably leads to chronic bronchitis, just as tobacco smoking does. Marijuana smoke contains more than 400 chemicals besides THC, and some of them are quite similar to tobacco "tars," including those that contribute to lung cancer. It is likely that smoking marijuana can lead to cancer of the lung, but, even if the risk is fairly high, another 15 to 20 years must pass before enough evidence accumulates in this country to show how much marijuana smoking is necessary to create a significant risk.

During the high, marijuana causes the heart to beat faster and work harder. Although this effect is insignificant in healthy people, it may be a hazard for anyone with heart disease.

Production of the male hormone testosterone and of sperm can be reduced by marijuana, although the effects appear to be temporary and reversible; the significance of these changes is unclear. Effects on females are even less well studied, but it appears that marijuana is capable of disturbing the menstrual cycle. During pregnancy, THC can pass into the placenta (where it tends to be stored) and the fetus. A nursing mother almost certainly would pass the substance in her milk. Milk production itself can be reduced by exposure to THC. Whether marijuana can cause genetic damage is simply not known. The subject has been controversial for more than a decade, and it remains so. Marijuana may, however, be capable of causing miscarriages or birth defects. Women who are pregnant should avoid all drugs except those that are medically necessary; the list of substances to avoid includes alcohol, tobacco, and marijuana. Both men and women who are planning to conceive a child should avoid drugs whenever possible.

(Continued on page 5)

Because THC can lower pressure within the eyeball, it has seemed promising as a treatment for glaucoma. However, its effects on the heart make the drug inappropriate for use in many older people, the group most likely to need glaucoma treatment. THC clearly can relieve the nausea and vomiting that sometimes accompany chemotherapy for cancer. Patients for whom other treatments have been ineffective have benefited from THC, though not all of them respond, and it is said that older patients are likely to be distressed by the "high" rather than find it enjoyable.

PLAYING IN THE GRASS: Little is known about marijuana's long-term effects on the children and adolescents who use it. Thus, their widespread use of the drug is a form of mass self-experimentation. These young "volunteers" can hardly be thought to have given their "informed consent." Even if marijuana proves to have few or no adverse effects on the health of young people, the time they spend "high" is time that could be spent in normal learning and physical activity. Growing up should be as drug-free as possible. It seems appropriate to take measures that will diminish marijuana use by young boys and girls, but how to do so is not very clear. Research conducted in the past ten years has some tentative implications for parents who wish to discourage their children's use of marijuana.

(1) Limiting access to the drug is one way. If a school or other area becomes identified as a source of supply, parents can take action to change matters.

(2) Peers are the major influence on youngsters' use of drugs; encouraging friendships with non-using companions may help to reduce the incentives and opportunities to indulge.

(3) Attempting to delay a child's experience with marijuana is probably worthwhile. The later someone begins to use the drug, the less likely he or she is to become heavily involved, according to some studies. (Most often, use tapers off spontaneously after the age of twenty-five.)

(4) It is always good policy for parents to reconsider their own approach to drink and drugs. The children of parents with a relatively casual attitude are more likely than others to become involved with all drugs.

Parents protect their children from drug use by being close to them, remaining actively involved with them and their friends, supporting their self-esteem, and expressing high expectations for achievement in school. However, once heavy drug involvement has begun, as it may even in close and supportive families, parents are often not able to help their children give up the habit, which in the case of marijuana is likely to taper off of its own accord in a few years.

It probably is not productive to let marijuana become ammunition in the war between the generations or to treat experimentation as a catastrophe. And some perspective about drugs should be kept. Just because tobacco and alcohol are more familiar does not mean that they are safer than marijuana. They are a very real threat to health at every age. Marijuana is still a somewhat uncertain factor, and it may have serious drawbacks, but it does not threaten lifelong severe addiction in the way that cigarettes do. Nor is it as toxic as alcohol. However, these comparisons should not lead to the conclusion that marijuana is safe.

IS THE SMOKE OF OTHERS DANGEROUS — OR SIMPLY A SMOKE SCREEN?

That question is among the more emotional issues faced by our society. And to date, the scientific answers have been scanty and frustratingly difficult to come by. There is no evidence that exposure to the smoke of others actually causes serious diseases of the lungs or heart. But there is evidence that such exposure can increase the danger for those with already existing heart or lung diseases. There is also evidence that a fetus developing in a woman who smokes during pregnancy

— or a child exposed to tobacco smoke in the home environment — is at increased risk for various health problems. But what about the question of exposure in public places — such as the workplace? The March 27, 1980 issue of The New England Journal of Medicine carries a study of 2100 workers demonstrating that healthy non-smokers chronically exposed to the smoke of others had a measurable change in two lung function tests similar to that of those who inhale between one and ten cigarettes per day. In an accompanying editorial, two scientists from the National Institutes of Health praise this study as providing for the first time a quantitative measurement of a physical change in healthy non-smokers exposed to the smoke of others. They conclude that the study "constitutes a foundation to be used by health planners and legislative bodies to stimulate the search for a public policy that is not only equitable but based on irrefutable scientific evidence."

VAGINAL INFECTIONS

Vaginal infections are among the more common annoying human afflictions. And, unfortunately, such infections are often treated inadequately or inappropriately — thereby causing unnecessary distress. The most important "rule" concerning the treatment of vaginal infections is to identify the exact cause — and then to treat it exactly. Too many infections are treated without any examination — often with applications that are ineffective or with "shotgun" creams that attempt to cover several possible organisms. (Recently, for example, two FDA advisory committees concluded that there is no adequate evidence that widely used sulfa creams are effective in eliminating the three organisms that most commonly cause vaginal infections.) Sometimes, a vaginal infection may be the first sign of diabetes. Rarely, underlying tumors may cause a vaginal discharge which is passed off as "just another infection."

In addition to the importance of exact diagnosis and treatment, the necessity of treating sexual partners should be recognized. Recurrent or continuing infections often can be traced to a woman's sexual partner who has never been treated and is a source of continued reinfection.

In summary, many ongoing problems with vaginal infections can be solved by careful diagnosis and exact treatment. There is usually no need to suffer the physical and emotional annoyance of prolonged symptoms.

LITHIUM REVISITED

Since its approval for use in the treatment of manic-depressive disease in 1949, lithium has literally salvaged hundreds of thousands of persons from a hellish existence with mood swings from deep depression to manic highs (characterized by irrational, exuberant behavior). However, as pointed out in a recent review of lithium in the February 22, 1980, issue of The Medical Letter, this drug may have a wide range of potentially dangerous side effects and drug interactions — not to mention possible associated birth defects in children of mothers taking lithium during pregnancy. Most recently, lithium has been implicated as a possible cause of serious and possibly irreversible kidney damage. All of this points to the need for careful use of lithium — both in initial patient selection and in ongoing monitoring of blood levels and side effects. In short, lithium remains an extremely valuable drug, but it should be given only under highly skilled medical supervision.

The goal of this Health Letter is to interpret timely health information, but its contents are not intended to provide medical advice for individual problems. The latter should be obtained from your physician. Unfortunately, we cannot respond to personal inquiries.

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NAS Panel Urges Pot Law Reform

WASHINGTON—A federal policy abolishing criminal penalties for marijuana use is "clearly preferable" to complete prohibition, according to a recent report by a prestigious panel of the National Academy of Sciences.

The report, prepared under the Academy's National Research Council following a 1978 request from the National Institute on Drug Abuse, evaluated the impact of recent changes in state marijuana laws and weighed the relative costs to individuals and society of major marijuana policy alternatives, including complete prohibition, partial prohibition, or decriminalization, and regulated legalization.

Noting that the current federal policy of complete prohibition "falls far short of its goal (of) preventing use," and that existing evidence indicates that "partial prohibition has been as effective in controlling consumption" while entailing "considerably smaller social, legal, and economic costs," the Research Council's 18-member Committee on Substance Abuse and Habitual Behavior concluded that "a policy of partial prohibition is clearly preferable to a policy of complete prohibition."

Of particular concern to the committee were the impact of major policy options on patterns of use, particularly among adolescents, and possible health consequences of smoking marijuana. In its published report, *An Analysis of Marijuana Policy*, the committee echoed the findings of an exhaustive Academy review of medical studies on marijuana released earlier this year, noting that while "conclusive evidence is lacking of major, long-term public health problems," these are "worrisome possibilities" making marijuana use "a cause for extreme concern."

However, in examining the effects of reduced state penalties on overall consumption, the committee reported that in those states in which a policy of partial prohibition has been adopted, "it has apparently not led to appreciably higher levels of use." Urging consideration of a variety of policy alternatives, the report concluded that it "can no longer be argued that use would be much more widespread and the problematic effects greater today if the policy of complete prohibition did not exist."

In contrast to the Academy's earlier report on marijuana and health, the new study was released with minimal publicity, and has since provoked sharp criticism from

NAS President Frank Press

a number of sources, including an unprecedented disavowal from Academy President Frank Press.

In a cover letter to NIDA Director William Pollin included in the published report, Press flatly rejected the committee's recommendations, contending that the panel had "insufficient" data to justify changes in current policies and had "gone beyond its charge" in rendering a judgment "so value-laden that it should have been left to the political process." Noting that recent surveys indicate a downward trend in high school marijuana use, Press concluded by expressing concern that the report might be "misunderstood" as implying that "new scientific data are suddenly available that justify changes in public attitudes" toward use of the drug.

According to a NIDA spokesperson, Pollin's sentiments closely parallel those of the Academy president's. "Dr. Pollin has been saying it would be a tragic mistake and a public health tragedy if we were to institute any change that might be construed as condoning marijuana use," she told **Drug Survival News**, adding that in Pollin's view, a reversal of present federal policy would "undercut the current downward trend in high school use."

The Reagan administration, through its chief drug advisor Carlton Turner, also disagreed with the committee's recommendations, and refused to acknowledge the report. "The report does not represent the views of this administration," Turner said in an official position statement. "We are against anything that fails to point out the dangers of marijuana use."

But according to most committee members, the report does emphasize current medical controversy regarding health implications of marijuana in its evaluation of major policy choices.

Citing "general availability, especially to school children," and the tremendous costs "of suppressing use under a policy of prohibition," Peter B. Dews, professor of psychiatry and psychobiology at Harvard Medical School and participant in both Academy studies, told **DSN** that a reexamination of current marijuana policy is essential. "Marijuana is not harmless, but not something that must be stamped out at all costs," he said, adding that "present measures are so ineffective and the consequences so bad, that we should carefully consider alternative approaches."

Acknowledging the danger of public misinterpretation of any policy change, Dews concluded that it is "unfortunate" that a serious examination of the consequences of complete prohibition had not been attempted since the early 1970s. "I think it's a pity that we have not considered the effects of the more violent attempts to supress the market and have gotten to the point that any attempt to change our current policy might be interpreted as sending an 'okay' message to the public," Dews said, adding that "any such change must be accompanied by a clear message that "society is not condoning, and certainly not encouraging," marijuana use.

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NEWS

Salmonellosis Traced To Midwest Marijuana

by Christina Dye

ATLANTA — The Centers for Disease Control have identified contaminated marijuana as the source of scattered outbreaks of a rare form of *salmonellosis*.

Sixty-two cases of the intestinal infection, commonly associated with food poisoning, were reported in Ohio and Michigan between December, 1980 and February, 1981. Recent outbreaks have occurred in Georgia, Alabama, California and Florida, with symptoms ranging from fever and nausea to intense abdominal pains and diarrhea.

"This type of *salmonellosis* only occurs about eight times a year (in Michigan)," Michigan Division of Disease Control investigator Harry McGee told *Drug Survival News*. "To have some 30 cases reported in a two-month period is really unusual."

McGee conducted field investigations in early 1981 to identify the cause of the epidemic, which was initially assumed to have been triggered by spoiled or contaminated holiday foods. His case-control study focused on locating a common factor for the unusual age groups exhibiting symptoms of infection. Well over half of the Michigan cases involved children less than three years of age, with the remainder concentrated in teenage and young adult categories. Similar age group breakdowns were reported in Ohio.

The Michigan study involved personal interviews with patients and matched control groups and seemed to indicate a strong association between the infection and household use of marijuana. The Division of Disease Control confirmed this association by growing *salmonella muenchen* bacteria from samples of marijuana obtained from stricken households.

The means by which the infection was transmitted to younger family members is unknown, according to health officials. "We can really only speculate," McGee explained. "While preparing the marijuana for smoking, the parent may have gotten it on his hands and transmitted it to the child in the course of feeding. It's also possible that the children may have put their hands in an ashtray and been infected (in this manner)." A third possibility is that the bacteria was spread through the air when the marijuana was burned.

Salmonellosis is a frequent contaminant of animal feces, particularly chickens and birds. CDC reports suggest that the marijuana could have been contaminated by animal feces during cultivation or drying and storage. "It can only be speculated," McGee said, "but my personal feeling is that it '(the marijuana) was stored in a barn somewhere and birds, probably chickens, ran over it. Ohio analyzed one sample which had a really high contamination level and I think this is the only way that high a level can be accounted for."

Due to the localized nature of the outbreaks and their simultaneous occurrence in Ohio and Michigan, health officials believe that the contaminated marijuana derived from a common source. It is not known whether the marijuana was cultivated domestically or imported.

The epidemics in Ohio and Michigan are the first reported instances in which marijuana has been identified as the source of a *salmonellosis* infection.

Infections Linked to Marijuana Fungus

MILWAUKEE — A common household fungus has been identified as a major contaminant in marijuana and poses a health threat to regular users, according to a researcher at the Medical College of Wisconsin.

The researcher, Dr. Steven Kagen, told *Drug Survival News* that the fungus, aspergillus, "can cause a number of lung diseases in man," including asthma and other chronic respiratory infections.

Dr. Kagen reported discovering a number of disease-causing fungi in marijuana samples he's analyzed, "but the most alarming one was that of aspergillus."

Dr. Kagen also reported that every marijuana sample, except one, which he's tested has been infested with aspergillus fungus.

Although normal body immune system responses would protect most users from aspergillus and other marijuana-mediated fungal infections, Dr. Kagan warned that patients smoking marijuana in conjunction with cancer chemotherapy or individuals with impaired immune responses "would be at risk of developing a more systemic or invasive fungus infections."

Symptoms of aspergillus-triggered lung infections include coughing, wheezing, and other asthma-like complications.

While burning destroys aspergillus in marijuana, spores are nevertheless transmitted to the lungs of a user in the smoking process. "It's not as though the fungus can survive fire," Dr. Kagen said. "It's merely that when people inhale and suck through the cigarette, they're inhaling viable organisms that have not yet been burned."

Dr. Kagen emphasized that aspergillus contamination is not caused by improper storage of marijuana, but conceded that the "lack of quality control" in marijuana production contributes to the problem. "It's there from the beginning and more than anything else, it's just a matter of it not being processed in a legal and standardized way."

According to Dr. Kagan, the fungus has a special affinity for marijuana. "It's found in nature on the marijuana leaf itself," Kagen said. "If a microbiologist wishes to culture the fungus, he will sometimes use the marijuana to grow the fungus on. The fungus 'likes' to grow on the plant."

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